

1 Characterization of the Ozone Weekend Effect in California

1.3 Analysis of the ozone weekend effect in the San Joaquin Valley Air Basin, including selected summaries for other air basins

1.3.1 Abstract

The San Joaquin Valley Air Basin (SJVAB) includes all or part of eight counties in the southern half of California's Central Valley. From north to south, these are San Joaquin County, Stanislaus County, Merced County, Madera County, Fresno County, Tulare County, Kings County, and Kern County.

This section presents analyses of the ozone weekend effect in the SJVAB. Long-term trends in ozone for weekends and weekdays from 1980 to 1998 are explored in Section 1.3.2. The long-term trends start in 1980 partly as an arbitrary choice and partly because it avoids transition years when ozone-measurement methods changed. Short-term trends for Fridays, Saturdays, Sundays, and Mondays during the 1990s are examined in Section 1.3.3. Changes in the daily maximum ozone from Friday to Saturday to Sunday and to Monday using data from 1996 – 1998 are discussed in Section 1.3.4.

1.3.2 Trends in ozone for weekends and weekdays from 1980 to 1998

Ozone data for 1980 through 1998 were selected from the California Air Quality Data CD (PTSD – 99 – 012 – CD). The maximum, hourly, ozone concentrations for the “ozone season” (May through October) for each day and each monitoring location were used to prepare trends. Table 1 displays the average concentrations by day-of-week during the ozone season.

The values in Table 1.3-1 were used to construct pictures of trends for 22 locations that had a minimum of seven years of available data between 1980 and 1998. Figure 1.3-1 through 1.3-22 present those trends. The figures are simplified to show a weekday trend (Mon. – Fri. average) and a weekend trend (Sat. – Sun. average).

As the trends demonstrate, progress toward attainment of federal and state standards for ozone has been slower in the SJVAB during the last 20 years compared to the South Coast and San Francisco Bay Area Air Basins.

1.3.3 Trends in ozone concentrations by day-of-week during the 1990s

Changes in ozone concentrations for Friday, Saturday, Sunday, and Monday during the 1990s are presented in Table 1.3-2. The changes are

based on differences between average values for 1992-1994 and 1996-1998 by day of week. Twenty-two locations had data in both periods; the differences in percent are expressed with respect to the earlier of the two periods.

As the results in Table 1.3-2 show, the overall average change in ozone was zero for Friday and Saturday, while Sunday and Monday increased slightly (2%). The slight increases on Saturday and Monday are not statistically significant.

Corresponding results (overall average) for Friday, Saturday, Sunday, and Monday in the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Metropolitan area are given in Table 1.3-3. Results in this table are based on the data in Table 2 of the Appendix to Section 1.4 in this Technical Support Document.

In addition to the overall average change in ozone, Table 1.3-2 average results for three sub-regions of the San Joaquin Valley – north, middle, south, and mountain. In the north, six of seven days showed slight decreases in ozone and the remaining day showed no change. In the middle, five of seven days showed slight to moderate increases in ozone and the remaining days showed no change. In the south and mountain regions, a mix of decreases and increases occurred among the days of the week. Saturday, Sunday, and Monday showed a slight increase or no change, while Tuesday through Friday showed slight to moderate decreases.

1.3.4 Day-of-week differences in ozone during the late 1990s

Day-of-week differences in ozone concentrations were determined for three pairs of days – Friday to Saturday, Saturday to Sunday, and Sunday to Monday. Using the maximum hourly concentration to represent ozone each day, sequential differences between pairs of days were calculated. Then, averages for these differences (in ppb) were calculated using results for May through October for 1996, 1997, and 1998.

Results are presented in Table 1.3-4. Differences are expressed as percent after dividing by the average concentration for the first of the two days. For example, average ozone changes at Arvin (first site in the table) were an increase of 1.7% from Friday to Saturday, a decrease of 1.1% from Saturday to Sunday, and a further decrease of 2.7% from Sunday to Monday.

The average of ozone concentration for Friday provides a reference point in ppb units. Therefore, the average ozone values at Arvin were 89.0 ppb on Friday, 90.5 ppb on Saturday, 89.5 ppb on Sunday, and 87.1 ppb on Monday.

The ozone weekend effect is shown in Table 1.3-4 and labeled as the highest weekday vs. Friday. The overall average for the ozone weekend effect (across all sites) was a 4.4% increase with respect to Friday.

The 28 sites in Table 1.3-4 are sorted from largest down to smallest average ozone concentration for Friday. Average results are then given for the 10 sites with the highest ozone on Friday, the next 10 sites with intermediate ozone on Friday, and the 8 sites with the lowest ozone on Friday. The pattern in the San Joaquin Valley is similar to the pattern in other air basins; the sites with the highest ozone show the smallest weekend effect.

A summary of corresponding results for the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Metropolitan Area are given in Table 1.3-5.

1.3.5 Conclusions

The ozone weekend effect in the San Joaquin Valley Air Basin is smaller compared to the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Valley Air Basin.

The ozone weekend effect tends to be smallest at the locations that experience the highest average ozone concentrations. These locations are usually downwind of major urban areas. This pattern also occurs in other air basins.

1.3.6 Recommendations

The San Joaquin Valley contains major population centers and is a major producer of agricultural goods and other materials. Recommendations offered in other chapters are echoed here:

- Improve emission inventories for weekdays and weekends.
- Improve air quality monitoring by maintaining long-term stations.
- Improve air quality monitoring by using artifact-free methods for measuring VOCs and NO_x.
- Conduct special studies to acquire reliable information on air quality aloft.

Some of these recommendations may be addressed by the Central California Ozone Study (CCOS), which is currently in progress. For example, new data should help improve emission inventories. Some of the new data is specifically designed at help determine differences in weekend and weekday inventories. In addition, measurements on air quality aloft will be collected during the study.

Following the conclusion of CCOS, any need for additional information can be assessed.

Table 1.3-1 Mean of ozone daily maxima (ppm) by day-of-week during May-Oct. at monitoring sites in the San Joaquin Valley.

(This table occupies the following 16 pages.)

Table 1.3.1. Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																			
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996			
Fresno-Cal State #2	060190241	1	0.084	0.086	0.077	0.072	0.087	0.079	0.093	0.098	0.090	0.056										
		2	0.090	0.086	0.081	0.077	0.088	0.077	0.098	0.104	0.088	0.050										
		3	0.096	0.089	0.088	0.080	0.093	0.087	0.098	0.105	0.089	0.054										
		4	0.103	0.094	0.090	0.083	0.089	0.083	0.091	0.100	0.095	0.056										
		5	0.099	0.095	0.087	0.084	0.082	0.077	0.092	0.098	0.090	0.055										
		6	0.098	0.097	0.081	0.080	0.091	0.083	0.093	0.093	0.092	0.061										
		7	0.092	0.102	0.077	0.080	0.095	0.081	0.088	0.097	0.099	0.055										
Fresno	060190007	1						0.075	0.080	0.073	0.074	0.080	0.075	0.079	0.083	0.083	0.079	0.069	0.069	0.084	0.072	0.084
Drummond Street		2						0.068	0.074	0.075	0.078	0.081	0.074	0.074	0.076	0.081	0.064	0.066	0.064	0.074	0.071	0.076
		3						0.076	0.082	0.069	0.081	0.081	0.079	0.074	0.080	0.082	0.070	0.069	0.069	0.071	0.070	0.076
		4						0.077	0.080	0.069	0.078	0.088	0.081	0.075	0.075	0.083	0.070	0.066	0.070	0.071	0.067	0.070
		5						0.069	0.079	0.072	0.074	0.086	0.077	0.072	0.072	0.074	0.071	0.067	0.062	0.071	0.063	0.070
		6						0.079	0.081	0.072	0.070	0.080	0.083	0.075	0.078	0.073	0.072	0.070	0.071	0.081	0.066	0.068
		7						0.082	0.086	0.071	0.074	0.090	0.080	0.084	0.083	0.080	0.078	0.074	0.073	0.087	0.071	0.076
Visalia-N Church Street	061072002	1	0.079	0.081	0.074	0.077	0.077	0.077	0.096	0.090	0.084	0.083	0.078	0.079	0.076	0.085	0.083	0.081	0.080	0.075	0.082	
		2	0.083	0.078	0.079	0.078	0.077	0.074	0.098	0.090	0.080	0.083	0.079	0.078	0.075	0.084	0.081	0.077	0.077	0.074	0.080	
		3	0.092	0.082	0.081	0.081	0.079	0.080	0.088	0.097	0.087	0.085	0.076	0.080	0.076	0.080	0.086	0.082	0.076	0.078	0.079	
		4	0.088	0.079	0.082	0.083	0.080	0.078	0.093	0.091	0.088	0.086	0.078	0.077	0.077	0.084	0.081	0.080	0.076	0.077	0.075	
		5	0.086	0.080	0.080	0.081	0.079	0.080	0.092	0.090	0.088	0.083	0.079	0.075	0.072	0.085	0.083	0.077	0.080	0.071	0.074	
		6	0.088	0.083	0.081	0.085	0.082	0.080	0.096	0.092	0.088	0.087	0.075	0.078	0.069	0.084	0.083	0.082	0.085	0.073	0.072	
		7	0.084	0.082	0.078	0.082	0.082	0.085	0.095	0.085	0.090	0.084	0.080	0.079	0.072	0.089	0.087	0.088	0.087	0.075	0.077	
Merced		1						0.077														
Merced College		2						0.080														
		3						0.087														
		4						0.086														
		5						0.083														
		6						0.081														
		7						0.080														

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Sequoia		1					0.075												
Lookout Point		2					0.071												
		3					0.070												
		4					0.076												
		5					0.077												
		6					0.080												
		7					0.076												
Sequoia Natl Park	061070002	1					0.093	0.077			0.071	0.074	0.073		0.083	0.078	0.073	0.086	
Giant Forest		2					0.088	0.077			0.069	0.077	0.072		0.080	0.074	0.070	0.082	
		3					0.083	0.079			0.073	0.078	0.075		0.078	0.081	0.075	0.082	
		4					0.069	0.072			0.073	0.080	0.073		0.085	0.086	0.076	0.081	
		5					0.081	0.082			0.070	0.075	0.074		0.082	0.082	0.071	0.081	
		6					0.096	0.085			0.075	0.078	0.077		0.081	0.084	0.071	0.083	
		7					0.101	0.082			0.077	0.077	0.077		0.081	0.083	0.075	0.084	
Turlock	060991003	1	0.067	0.069	0.074	0.076	0.075	0.080	0.085	0.079	0.068	0.064	0.071	0.068					
Monte Vista #1		2	0.069	0.071	0.076	0.083	0.078	0.060	0.087	0.076	0.073	0.066	0.070	0.068					
		3	0.070	0.073	0.084	0.084	0.083	0.055	0.094	0.080	0.072	0.071	0.070	0.072					
		4	0.073	0.074	0.080	0.073	0.083	0.065	0.090	0.081	0.071	0.067	0.069	0.078					
		5	0.072	0.075	0.079	0.070	0.074	0.050	0.090	0.079	0.074	0.068	0.069	0.079					
		6	0.081	0.072	0.079	0.079	0.084	0.055	0.084	0.082	0.080	0.067	0.070	0.076					
		7	0.072	0.071	0.084	0.078	0.083	0.070	0.083	0.084	0.071	0.071	0.071	0.071					
Stockton	060771002	1	0.065	0.062	0.057	0.056	0.064	0.062	0.058	0.061	0.066	0.047	0.060	0.067	0.066	0.062	0.065	0.062	0.064
Hazelton Street		2	0.064	0.056	0.058	0.067	0.069	0.057	0.056	0.062	0.065	0.046	0.057	0.062	0.064	0.054	0.065	0.054	0.054
		3	0.068	0.065	0.061	0.067	0.068	0.064	0.053	0.064	0.064	0.047	0.058	0.060	0.064	0.052	0.064	0.057	0.056
		4	0.062	0.064	0.057	0.069	0.061	0.063	0.051	0.061	0.063	0.046	0.058	0.059	0.061	0.057	0.060	0.052	0.052
		5	0.066	0.059	0.060	0.060	0.058	0.060	0.052	0.063	0.061	0.049	0.057	0.060	0.058	0.054	0.057	0.056	0.057
		6	0.062	0.062	0.057	0.060	0.060	0.061	0.046	0.059	0.063	0.053	0.052	0.059	0.056	0.060	0.057	0.059	0.052
		7	0.064	0.065	0.059	0.064	0.062	0.067	0.055	0.062	0.071	0.049	0.062	0.066	0.064	0.066	0.064	0.065	0.059

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																		
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Parlier	060194001	1				0.082	0.090	0.091	0.095	0.090	0.093	0.088	0.076	0.092	0.086	0.084	0.070	0.079	0.090	0.086	0.087
		2				0.080	0.090	0.099	0.102	0.099	0.096	0.088	0.076	0.085	0.084	0.078	0.072	0.079	0.086	0.089	0.087
		3				0.103	0.092	0.097	0.102	0.102	0.100	0.093	0.080	0.092	0.087	0.079	0.078	0.083	0.084	0.089	0.084
		4				0.113	0.096	0.092	0.098	0.101	0.101	0.090	0.077	0.086	0.087	0.085	0.076	0.084	0.086	0.086	0.081
		5				0.103	0.082	0.096	0.096	0.095	0.102	0.091	0.080	0.086	0.085	0.085	0.075	0.075	0.088	0.083	0.080
		6				0.113	0.095	0.100	0.095	0.096	0.103	0.097	0.076	0.090	0.082	0.084	0.078	0.085	0.095	0.087	0.076
		7				0.092	0.095	0.102	0.097	0.092	0.101	0.095	0.082	0.090	0.086	0.090	0.076	0.086	0.096	0.085	0.081
Bakersfield	060290004	1	0.079	0.074	0.072	0.079	0.079	0.083	0.083	0.084	0.086	0.076	0.076	0.084	0.081	0.088					
Chester Street		2	0.075	0.068	0.076	0.079	0.077	0.073	0.079	0.088	0.084	0.074	0.074	0.081	0.076	0.077					
		3	0.081	0.077	0.077	0.082	0.073	0.077	0.078	0.091	0.084	0.085	0.078	0.084	0.075	0.080					
		4	0.081	0.077	0.078	0.080	0.077	0.083	0.078	0.088	0.089	0.079	0.075	0.076	0.074	0.082					
		5	0.082	0.081	0.077	0.080	0.073	0.082	0.072	0.088	0.089	0.078	0.075	0.079	0.074	0.081					
		6	0.080	0.084	0.075	0.075	0.080	0.085	0.079	0.081	0.088	0.086	0.076	0.084	0.072	0.083					
		7	0.079	0.078	0.077	0.087	0.080	0.083	0.082	0.081	0.089	0.083	0.078	0.081	0.076	0.086					
Oildale	060290231	1	0.082	0.070	0.070	0.079															
3021 Manor Street		2	0.085	0.067	0.074	0.078															
		3	0.093	0.071	0.077	0.083															
		4	0.099	0.072	0.076	0.078															
		5	0.096	0.074	0.077	0.082															
		6	0.091	0.082	0.075	0.078															
		7	0.085	0.076	0.076	0.087															
Sequoia Natl Park	061071001	1				0.093	0.078	0.082	0.084	0.098	0.000	0.000	0.074	0.077	0.078	0.000	0.079				
Ash Mountain #2		2				0.096	0.077	0.085	0.085	0.100	0.000	0.000	0.074	0.080	0.079	0.000	0.078				
		3				0.099	0.081	0.088	0.087	0.102	0.000	0.000	0.078	0.082	0.082	0.000	0.078				
		4				0.099	0.083	0.106	0.088	0.092	0.000	0.000	0.075	0.081	0.079	0.000	0.082				
		5				0.101	0.078	0.106	0.089	0.097	0.000	0.000	0.075	0.079	0.080	0.000	0.081				
		6				0.102	0.082	0.101	0.094	0.103	0.000	0.000	0.079	0.082	0.082	0.000	0.079				
		7				0.091	0.079	0.090	0.089	0.108	0.000	0.000	0.079	0.079	0.082	0.000	0.079				

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Table 1.3.1 (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct at monitoring sites in the San Joaquin Valley

Site Name	AIRS* Site Number	Day of Week	Year																		
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Coalinga-Cherry	060190001	1	0.056	0.056	0.063	0.063															
		2	0.061	0.050	0.062	0.068															
		3	0.068	0.052	0.069	0.071															
		4	0.067	0.058	0.074	0.067															
		5	0.069	0.053	0.068	0.070															
		6	0.069	0.050	0.069	0.072															
		7	0.060	0.052	0.063	0.075															
Edison	060290007	1	0.087	0.083	0.082	0.078	0.097	0.091	0.098	0.103	0.090	0.094	0.095	0.084	0.100	0.095	0.101	0.099	0.079	0.093	
		2	0.085	0.083	0.077	0.078	0.087	0.092	0.100	0.095	0.087	0.091	0.095	0.081	0.093	0.093	0.096	0.088	0.081	0.089	
		3	0.093	0.084	0.084	0.079	0.094	0.090	0.105	0.100	0.096	0.094	0.094	0.080	0.092	0.098	0.096	0.087	0.079	0.083	
		4	0.095	0.090	0.085	0.080	0.097	0.090	0.097	0.108	0.096	0.092	0.089	0.076	0.097	0.103	0.098	0.087	0.083	0.081	
		5	0.095	0.083	0.087	0.078	0.094	0.088	0.102	0.113	0.090	0.092	0.090	0.078	0.095	0.101	0.094	0.086	0.077	0.080	
		6	0.100	0.083	0.083	0.082	0.101	0.090	0.098	0.107	0.096	0.094	0.097	0.076	0.092	0.101	0.101	0.094	0.078	0.082	
		7	0.097	0.084	0.092	0.082	0.099	0.090	0.092	0.107	0.094	0.098	0.089	0.081	0.099	0.098	0.100	0.099	0.080	0.087	
Fresno-Olive Street	060190005	1	0.072	0.067	0.062	0.061	0.058	0.073	0.070	0.084	0.078	0.073									
		2	0.073	0.060	0.062	0.066	0.054	0.064	0.069	0.087	0.076	0.069									
		3	0.078	0.066	0.065	0.068	0.060	0.076	0.066	0.086	0.077	0.079									
		4	0.080	0.067	0.063	0.068	0.056	0.074	0.065	0.087	0.084	0.077									
		5	0.081	0.067	0.071	0.065	0.053	0.069	0.062	0.077	0.079	0.076									
		6	0.080	0.072	0.066	0.064	0.057	0.074	0.064	0.077	0.077	0.082									
		7	0.074	0.072	0.061	0.069	0.062	0.072	0.060	0.082	0.088	0.079									
Stockton-Union Island	060770005	1	0.065																		
		2	0.058																		
		3	0.053																		
		4	0.048																		
		5	0.056																		
		6	0.052																		
		7	0.066																		

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																	
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Mountain Home		1					0.071													
SF Headquarters		2					0.073													
		3					0.077													
		4					0.083													
		5					0.084													
		6					0.076													
		7					0.084													
Lodi-Ham	060770002	1	0.068	0.062	0.066															
		2	0.073	0.062	0.065															
		3	0.074	0.071	0.071															
		4	0.066	0.075	0.068															
		5	0.071	0.068	0.074															
		6	0.070	0.073	0.065															
		7	0.068	0.070	0.063															
Crows Landing-Davis	060991004	1					0.075	0.070	0.063	0.065										
		2					0.079	0.073	0.068	0.068										
		3					0.084	0.074	0.069	0.071										
		4					0.080	0.075	0.068	0.064										
		5					0.081	0.070	0.069	0.068										
		6					0.069	0.076	0.076	0.065										
		7					0.073	0.079	0.072	0.072										
Modesto		1				0.058														
Jennings Road		2				0.064														
		3				0.073														
		4				0.067														
		5				0.063														
		6				0.066														
		7				0.065														

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Fresno-Butler	060190240	1	0.084	0.079	0.081	0.079	0.089	0.078	0.077										
		2	0.094	0.083	0.084	0.088	0.088	0.074	0.060										
		3	0.100	0.087	0.090	0.090	0.089	0.077	0.070										
		4	0.102	0.084	0.090	0.090	0.091	0.077	0.063										
		5	0.104	0.090	0.092	0.088	0.076	0.076	0.069										
		6	0.098	0.093	0.085	0.087	0.081	0.080	0.069										
		7	0.088	0.088	0.081	0.089	0.096	0.087	0.075										
Fresno-L Street	060190239	1	0.072	0.070	0.072	0.063													
		2	0.075	0.065	0.072	0.072													
		3	0.079	0.073	0.074	0.068													
		4	0.076	0.068	0.076	0.073													
		5	0.078	0.071	0.078	0.068													
		6	0.070	0.069	0.074	0.078													
		7	0.074	0.074	0.072	0.084													
Hanford	060311001	1	0.054	0.052	0.065	0.069	0.072	0.068	0.060	0.083	0.074	0.060	0.063	0.068	0.063	0.069			
		2	0.055	0.051	0.066	0.070	0.073	0.061	0.056	0.079	0.070	0.062	0.064	0.068	0.059	0.059			
		3	0.060	0.055	0.070	0.075	0.073	0.068	0.054	0.088	0.079	0.065	0.065	0.071	0.060	0.061			
		4	0.060	0.054	0.072	0.074	0.072	0.067	0.060	0.084	0.078	0.065	0.063	0.070	0.062	0.064			
		5	0.057	0.055	0.069	0.072	0.072	0.076	0.062	0.077	0.079	0.062	0.067	0.067	0.059	0.063			
		6	0.058	0.055	0.075	0.076	0.076	0.079	0.057	0.069	0.078	0.069	0.065	0.071	0.057	0.063			
		7	0.056	0.052	0.071	0.077	0.079	0.076	0.055	0.074	0.084	0.067	0.066	0.071	0.061	0.072			
Stockton-E Mariposa	060770009	1				0.073	0.074	0.072	0.073	0.081	0.072	0.056	0.067	0.073	0.069	0.067	0.065	0.063	0.064
		2				0.083	0.081	0.066	0.076	0.084	0.067	0.061	0.066	0.072	0.073	0.062	0.068	0.059	0.057
		3				0.081	0.080	0.075	0.073	0.082	0.073	0.059	0.067	0.069	0.074	0.059	0.069	0.062	0.059
		4				0.083	0.073	0.076	0.067	0.084	0.081	0.058	0.064	0.062	0.067	0.065	0.064	0.058	0.055
		5				0.076	0.072	0.070	0.075	0.084	0.074	0.067	0.065	0.065	0.065	0.063	0.065	0.059	0.058
		6				0.074	0.075	0.075	0.068	0.075	0.079	0.067	0.060	0.065	0.060	0.065	0.065	0.059	0.064
		7				0.079	0.072	0.080	0.072	0.077	0.082	0.061	0.067	0.069	0.069	0.070	0.066	0.065	0.059

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																	
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Valley Home-School		1																		
		2																		
		3																		
		4																		
		5																		
		6																		
		7																		
Oildale	060290230	1	0.075																	
Fire Station #63		2	0.075																	
		3	0.081																	
		4	0.082																	
		5	0.079																	
		6	0.080																	
		7	0.077																	
Madera	060390002	1	0.073									0.064	0.054	0.074	0.067	0.083	0.062	0.069	0.081	
Health Dept #2		2	0.075									0.063	0.061	0.069	0.072	0.070	0.062	0.067	0.073	
		3	0.079									0.073	0.067	0.075	0.076	0.073	0.064	0.071	0.077	
		4	0.077									0.073	0.071	0.074	0.073	0.074	0.062	0.071	0.074	
		5	0.085									0.070	0.070	0.074	0.071	0.077	0.061	0.068	0.074	
		6	0.086									0.074	0.067	0.072	0.069	0.078	0.063	0.071	0.080	
		7	0.083									0.070	0.060	0.075	0.071	0.081	0.066	0.073	0.085	
McKittrick	060290006	1										0.080								
Highways 58 & 33		2										0.082								
		3										0.083								
		4										0.081								
		5										0.081								
		6										0.080								
		7										0.080								

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Week	Day of	Year																
				1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Modesto-J Street	060990001	1	0.063																	
		2	0.062																	
		3	0.070																	
		4	0.065																	
		5	0.066																	
		6	0.062																	
		7	0.064																	
Five Points	060191002	1	0.052	0.058	0.049	0.055	0.048													
		2	0.057	0.058	0.052	0.055	0.053													
		3	0.059	0.060	0.056	0.062	0.070													
		4	0.059	0.061	0.056	0.064	0.058													
		5	0.058	0.059	0.054	0.064	0.065													
		6	0.060	0.061	0.055	0.063	0.070													
		7	0.055	0.061	0.052	0.065	0.066													
Sequoia Natl Park	061070003	1		0.073	0.070															
		2		0.077	0.064															
		3		0.084	0.070															
		4		0.084	0.074															
		5		0.066	0.066															
		6		0.076	0.074															
		7		0.079	0.069															
Oildale	060290232	1			0.062	0.079	0.082	0.079	0.078	0.085	0.073	0.074	0.080	0.079	0.075	0.071	0.075	0.081	0.067	0.080
		2			0.054	0.080	0.075	0.082	0.079	0.082	0.075	0.078	0.080	0.074	0.069	0.073	0.072	0.077	0.067	0.078
		3			0.073	0.078	0.078	0.082	0.084	0.082	0.081	0.076	0.080	0.076	0.072	0.076	0.074	0.077	0.071	0.077
		4			0.085	0.084	0.083	0.076	0.082	0.088	0.075	0.076	0.079	0.076	0.071	0.075	0.077	0.077	0.070	0.075
		5			0.078	0.079	0.082	0.076	0.082	0.091	0.077	0.076	0.077	0.078	0.073	0.077	0.073	0.075	0.066	0.074
		6			0.073	0.084	0.084	0.079	0.074	0.090	0.082	0.075	0.081	0.072	0.074	0.078	0.079	0.081	0.068	0.073
		7			0.078	0.084	0.084	0.077	0.077	0.091	0.079	0.077	0.077	0.074	0.075	0.077	0.080	0.082	0.071	0.078

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																				
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998		
Shaver Lake	060191003	1	0.063	0.065	0.058	0.052																	
		2	0.064	0.066	0.058	0.053																	
		3	0.069	0.072	0.064	0.058																	
		4	0.066	0.073	0.062	0.059																	
		5	0.068	0.071	0.058	0.057																	
		6	0.066	0.069	0.064	0.059																	
		7	0.067	0.066	0.061	0.060																	
Modesto-14th Street	060990005	1	0.067	0.062	0.056	0.069	0.065	0.074	0.080	0.070	0.063	0.065	0.069	0.065	0.070	0.071	0.070	0.075	0.065	0.073			
		2	0.065	0.059	0.057	0.070	0.059	0.074	0.074	0.064	0.064	0.059	0.063	0.064	0.060	0.068	0.061	0.064	0.063	0.069			
		3	0.070	0.060	0.061	0.075	0.064	0.077	0.082	0.067	0.065	0.060	0.063	0.061	0.060	0.069	0.064	0.066	0.061	0.066			
		4	0.069	0.058	0.057	0.064	0.066	0.066	0.075	0.067	0.063	0.059	0.060	0.062	0.062	0.063	0.061	0.061	0.056	0.063			
		5	0.064	0.061	0.048	0.063	0.060	0.071	0.078	0.066	0.066	0.065	0.064	0.060	0.060	0.062	0.061	0.065	0.060	0.062			
		6	0.071	0.059	0.051	0.066	0.066	0.066	0.072	0.068	0.069	0.062	0.062	0.057	0.062	0.064	0.064	0.071	0.055	0.065			
		7	0.073	0.060	0.063	0.074	0.072	0.072	0.076	0.077	0.066	0.071	0.069	0.067	0.071	0.073	0.071	0.077	0.062	0.072			
Fresno	060190242	1									0.076	0.081	0.083	0.069		0.085	0.081	0.082	0.076	0.077	0.083	0.072	0.085
Sierra Skypark #2		2									0.073	0.088	0.084	0.072		0.079	0.079	0.066	0.074	0.074	0.073	0.076	0.083
		3									0.081	0.091	0.080	0.080		0.088	0.086	0.074	0.077	0.081	0.074	0.073	0.085
		4									0.075	0.089	0.085	0.080		0.089	0.084	0.073	0.077	0.080	0.074	0.073	0.080
		5									0.071	0.084	0.086	0.075		0.086	0.079	0.074	0.076	0.075	0.071	0.067	0.078
		6									0.076	0.086	0.085	0.084		0.080	0.079	0.074	0.076	0.081	0.082	0.071	0.076
		7									0.079	0.081	0.091	0.077		0.092	0.080	0.080	0.081	0.083	0.084	0.070	0.079
Fresno	060190006	1					0.060	0.088	0.064	0.081													
Herndon Skypark		2					0.064	0.084	0.064	0.085													
		3					0.083	0.089	0.073	0.080													
		4					0.088	0.085	0.067	0.077													
		5					0.090	0.082	0.068	0.084													
		6					0.093	0.082	0.070	0.080													
		7					0.080	0.088	0.065	0.073													

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																		
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Kettleman City	060311003	1																			
CalTrans		2																			
		3																			
		4																			
		5																			
		6																			
		7																			
Maricopa	060290008	1																			
Stanislaus Street		2																			
		3																			
		4																			
		5																			
		6																			
		7																			
Arvin	060295001	1																			
Bear Mountain Blvd		2																			
		3																			
		4																			
		5																			
		6																			
		7																			
Wilsonia-Grant Grove	061070007	1																			
		2																			
		3																			
		4																			
		5																			
		6																			
		7																			

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																			
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996			
Shafter-Walker Street	060296001	1										0.073	0.070	0.072	0.072	0.075	0.073	0.075	0.080	0.064	0.074	
		2										0.076	0.072	0.075	0.069	0.067	0.073	0.070	0.077	0.066	0.072	
		3										0.084	0.074	0.076	0.068	0.070	0.076	0.075	0.076	0.070	0.071	
		4										0.078	0.074	0.073	0.071	0.072	0.073	0.076	0.077	0.070	0.069	
		5										0.081	0.074	0.076	0.072	0.070	0.075	0.073	0.073	0.064	0.069	
		6										0.086	0.071	0.076	0.067	0.074	0.078	0.078	0.081	0.067	0.067	
		7										0.081	0.073	0.075	0.072	0.078	0.079	0.078	0.080	0.070	0.070	
Turlock	060990006	1											0.072	0.071	0.070	0.070	0.076	0.068	0.068	0.077		
S Minaret Street		2											0.075	0.065	0.071	0.065	0.073	0.073	0.073	0.073		
		3											0.074	0.065	0.069	0.072	0.070	0.069	0.072			
		4											0.072	0.067	0.066	0.066	0.066	0.069	0.069	0.069		
		5											0.070	0.065	0.065	0.067	0.068	0.066	0.068	0.066		
		6											0.068	0.065	0.067	0.072	0.076	0.066	0.066	0.067		
		7											0.075	0.071	0.073	0.076	0.079	0.067	0.075			
Westley-Truck Stop	060992003	1											0.058									
Madera-Road 28	060390003	2											0.061									
		3											0.064									
		4											0.063									
		5											0.065									
		6											0.060									
		7											0.063									
														0.082	0.064							
		1											0.086	0.063								
		2											0.078	0.073								
		3											0.075	0.073								
		4											0.081	0.070								
		5											0.078	0.074								
		6											0.092	0.070								
		7																				

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Fresno-1st Street	060190008	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
Merced	060470003	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
S Coffee Avenue	060470003	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
Clovis-N Villa Avenue	060195001	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
Sequoia Natl Park	061070006	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
Lower Kaweah	061070006	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Sequoia Natl Park	061070005	1								0.085	0.082	0.074	0.077	0.078	0.075	0.078	0.077	0.076	0.081
		2								0.088	0.083	0.075	0.080	0.079	0.079	0.077	0.076	0.075	0.079
		3								0.092	0.085	0.079	0.083	0.082	0.079	0.077	0.084	0.079	0.079
		4								0.091	0.090	0.077	0.082	0.080	0.078	0.081	0.085	0.080	0.084
		5								0.089	0.092	0.076	0.079	0.081	0.081	0.081	0.086	0.077	0.083
		6								0.088	0.089	0.079	0.082	0.084	0.081	0.078	0.089	0.078	0.086
		7								0.083	0.088	0.079	0.080	0.081	0.078	0.078	0.084	0.081	0.085
Hanford	060311004	1															0.069	0.063	0.089
		2															0.070	0.062	0.087
		3															0.073	0.067	0.086
		4															0.071	0.066	0.084
		5															0.069	0.063	0.086
		6															0.070	0.069	0.096
		7															0.073	0.066	0.095
Tracy	060773002	1															0.062	0.052	
		2															0.065	0.050	
		3															0.058	0.048	
		4															0.055	0.049	
		5															0.052	0.050	
		6															0.054	0.050	
		7															0.059	0.050	
Bakersfield	060290010	1															0.077	0.077	0.086
		2															0.070	0.071	0.076
		3															0.077	0.073	0.075
		4															0.077	0.077	0.075
		5															0.080	0.072	0.074
		6															0.077	0.075	0.079
		7															0.083	0.080	0.084

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Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year																		
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
Bakersfield 5558 California Ave.	060290014	1															0.071	0.083	0.085	0.073	0.078
		2															0.074	0.080	0.082	0.074	0.076
		3															0.076	0.080	0.081	0.076	0.074
		4															0.077	0.083	0.083	0.075	0.072
		5															0.079	0.081	0.080	0.071	0.071
		6															0.079	0.086	0.086	0.073	0.071
		7															0.076	0.087	0.087	0.076	0.075
Crows Landing NAS-Fire Station	060991005	1															0.072	0.061	0.067		
		2															0.074	0.062	0.059		
		3															0.070	0.066	0.057		
		4															0.069	0.065	0.058		
		5															0.070	0.065	0.059		
		6															0.070	0.065	0.068		
		7															0.071	0.068	0.072		
Tracy 24371 Patterson Pass Rd.	060773003	1															0.064	0.075	0.055	0.064	
		2															0.059	0.067	0.060	0.059	
		3															0.066	0.068	0.058	0.056	
		4															0.062	0.063	0.052	0.053	
		5															0.057	0.067	0.056	0.051	
		6															0.063	0.070	0.050	0.054	
		7															0.062	0.074	0.053	0.061	
Shaver Lake Perimeter Road	060190010	1															0.073	0.085	0.070	0.071	
		2															0.066	0.083	0.070	0.074	
		3															0.077	0.084	0.073	0.075	
		4															0.085	0.086	0.074	0.074	
		5															0.075	0.084	0.071	0.071	
		6															0.072	0.084	0.073	0.071	
		7															0.080	0.084	0.074	0.069	

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3.1. (continued) Mean of daily ozone maxima (ppm) by day-of-week during May - Oct. at monitoring sites in the San Joaquin Valley.

Site Name	AIRS* Site Number	Day of Week	Year															
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Sequoia National Pk	061070008	1															0.076	0.074
Lookout Point		2															0.079	0.077
		3															0.082	0.079
		4															0.083	0.078
		5															0.080	0.079
		6															0.082	0.074
		7															0.083	0.075
Madera-Road 29	060390004	1															0.060	0.067
		2															0.059	0.068
		3															0.062	0.069
		4															0.070	0.065
		5															0.056	0.060
		6															0.054	0.062
		7															0.055	0.065
Modesto-Rover	060990010	1																0.050
14th Street		2																0.041
		3																0.034
		4																0.042
		5																0.039
		6																0.036
		7																0.049

* AIRS is the US/EPA's Aerometric Information Retrieval System.

Table 1.3-2 Percent change* in ozone from 1992/94 to 1996/98 by day-of-week for twenty-two monitoring locations in the San Joaquin Valley.

Subregion	Site	Day of week						
		Sun	Mon	Tue	Wed	Thu	Fri	Sat
North	Madera - Health Dept. #2	13.9%	6.8%	8.7%	6.1%	5.8%	15.2%	17.0%
North	Madera - Road 28	-3.9%	-1.9%	-7.5%	-10.9%	-11.0%	-5.1%	-7.3%
North	Merced - S. Coffee Ave.	-6.8%	-5.3%	-9.1%	-10.7%	-10.4%	-7.4%	-7.1%
North	Modesto - 14th St.	3.7%	2.1%	2.2%	-3.7%	2.0%	4.2%	-0.4%
North	Stockton - E. Mariposa	-9.7%	-13.6%	-16.4%	-18.4%	-13.0%	-9.1%	-11.5%
North	Stockton - Hazelton	-3.5%	-7.5%	-9.0%	-13.2%	-4.3%	-5.7%	-5.6%
North	Turlock - S. Minaret	4.0%	3.5%	1.5%	-0.5%	0.8%	4.3%	1.1%
Middle	Clovis	8.0%	13.7%	8.6%	4.1%	2.2%	10.0%	7.0%
Middle	Fresno - Drummond	3.8%	4.4%	-1.6%	-4.9%	-4.1%	0.0%	1.0%
Middle	Fresno - Sierra Skypark #2	0.2%	6.2%	-1.7%	-2.8%	-5.4%	0.3%	-3.4%
Middle	Hanford	14.7%	15.5%	11.0%	8.9%	10.7%	14.0%	11.4%
Middle	Parlier	9.9%	12.3%	4.6%	2.2%	2.8%	6.0%	4.3%
Middle	Visalia	-2.7%	-3.8%	-3.8%	-5.5%	-6.2%	-3.0%	-3.6%
South	Arvin - Bear Mountain Blvd.	-1.5%	-4.4%	-3.4%	-3.4%	-9.8%	-3.3%	-3.3%
South	Bakersfield - California Ave.	11.3%	4.4%	1.7%	-0.6%	-6.2%	-2.9%	4.6%
South	Bakersfield - Golden St. Hwy.	1.8%	3.0%	-5.9%	-7.7%	-13.1%	-8.1%	-6.6%
South	Edison	-3.1%	-3.1%	-7.3%	-9.7%	-11.4%	-5.4%	-4.8%
South	Maricopa - Stanislaus St.	5.5%	9.9%	7.2%	5.4%	1.2%	5.6%	5.9%
South	Oildale - 3311 Manor St.	1.6%	3.0%	0.0%	-0.5%	-5.4%	-0.4%	2.2%
Mountain	Sequoia - Ash Mtn. #1	5.8%	2.6%	-0.8%	3.4%	0.4%	4.4%	6.7%
Mountain	Sequoia - Giant Forest	6.7%	6.7%	3.3%	-4.8%	-1.3%	0.5%	1.7%
Mountain	Sequoia - Lower Kaweah	-9.1%	-6.3%	-6.3%	-7.6%	-10.1%	-11.3%	-8.0%
Averages								
Overall	2%	2%	-1%	-3%	-4%	0%	0%	
North	0%	-2%	-4%	-7%	-4%	-1%	-2%	
Middle	6%	8%	3%	0%	0%	5%	3%	
South	2.6%	2.1%	-1.3%	-2.7%	-7.5%	-2.4%	-0.3%	
Mountain	1.1%	1.0%	-1.3%	-3.0%	-3.7%	-2.1%	0.1%	

Table 1.3-3. Change in ozone by day-of-week from 1990/92 to 1996/98 in the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Metropolitan Area.

Region	Sites Used	Day of Week			
		Friday	Saturday	Sunday	Monday
South Coast	18	-25%	-25%	-16%	-22%
S.F. Bay Area	18	-18%	-18%	-8%	-7%
Sacramento	7	-11%	-15%	-7%	-6%

Table 1.3-4 Percent change in ozone for day-of-week transitions in the San Joaquin Valley Air Basin based on data for 1996 through 1998.

Site	Avg. Friday Ozone (ppb)	Percent Difference Between Days			Highest Weekend Day vs. Friday
		Fri. to Sat.	Sat. to Sun.	Sun. to Mon.	
Arvin	89	1.7%	-1.1%	-2.7%	1.7%
Clovis	87	2.5%	1.7%	-2.0%	4.3%
Sequoia #1	86	-1.2%	-5.1%	-2.1%	-1.2%
Parlier	86	1.6%	-0.1%	-0.4%	1.6%
Edison	85	4.1%	1.5%	-4.4%	5.6%
Seq. Giant Forest	83	0.4%	3.1%	-4.4%	3.5%
Maricopa	81	-0.7%	-1.4%	1.1%	-0.7%
Madera	80	5.3%	-4.6%	-9.8%	5.3%
Hanford	80	0.9%	-2.7%	1.3%	0.9%
<u>Seq. Lookout Pt.</u>	<u>78</u>	<u>0.6%</u>	<u>-5.3%</u>	<u>3.4%</u>	<u>0.6%</u>
<i>Averages for top 10 =</i>	<i>83.5</i>	<i>1.5%</i>	<i>-1.4%</i>	<i>-2.0%</i>	<i>2.2%</i>
Fresno Sierra	77	1.4%	2.4%	-2.7%	3.8%
Bakersfield, California	77	3.3%	-1.4%	-1.6%	3.3%
Fresno, 1st	76	4.2%	2.1%	-3.8%	6.3%
Visalia	76	3.9%	-0.9%	-2.8%	3.9%
Shaver Lake	76	-0.5%	-0.7%	0.6%	-0.5%
Sequoia	74	1.2%	-4.0%	-0.2%	1.2%
Oildale	74	3.6%	-1.5%	-3.0%	3.6%
Fresno, Drummond	71	8.8%	1.8%	-6.9%	10.8%
Shafter	71	2.0%	-1.2%	-1.3%	2.0%
<u>Bakersfield, Gold. St.</u>	<u>71</u>	<u>8.5%</u>	<u>0.9%</u>	<u>-7.6%</u>	<u>9.5%</u>
<i>Averages for top 10 =</i>	<i>74.3</i>	<i>3.7%</i>	<i>-0.3%</i>	<i>-2.9%</i>	<i>4.4%</i>
Merced, Coffee	71	2.4%	-2.0%	0.4%	2.4%
Turlock	70	5.4%	-0.4%	-1.0%	5.4%
Crows Landing	68	5.8%	-7.4%	-8.0%	5.8%
Modesto, 14th	63	10.3%	0.7%	-8.1%	11.1%
Madera, Rd. 29	58	2.6%	5.0%	1.8%	7.8%
Tracy	58	8.1%	2.3%	-4.1%	10.6%
Stockton, E. Mariposa	58	4.2%	0.2%	-4.0%	4.4%
<u>Stockton, Hazelton</u>	<u>55</u>	<u>11.6%</u>	<u>0.0%</u>	<u>-9.2%</u>	<u>11.6%</u>
<i>Averages for lowest 8 =</i>	<i>62.6</i>	<i>6.3%</i>	<i>-0.2%</i>	<i>-4.0%</i>	<i>7.4%</i>
Average overall	74.6	3.6%	-0.7%	-2.9%	4.4%

Table 1.3-5 Percent change in ozone for day-of-week transitions in the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Metropolitan Area based on data for 1996 through 1998.

<u>Region</u>	<u>Avg. Friday Ozone (ppb)</u>	<u>Percent Difference Between Days</u>			<u>Highest Weekend Day vs. Friday</u>
		<u>Fri. to Sat.</u>	<u>Sat. to Sun.</u>	<u>Sun. to Mon.</u>	
South Coast Air Basin	68	19%	11%	-22%	32%
San Francisco Bay Area Air Basin	37	15%	10%	-12%	25%
Sacramento Metropolitan Area	59	4%	4%	1%	8%

Figure 1.3-1 Averages by year based on data in Table 1.3-1.

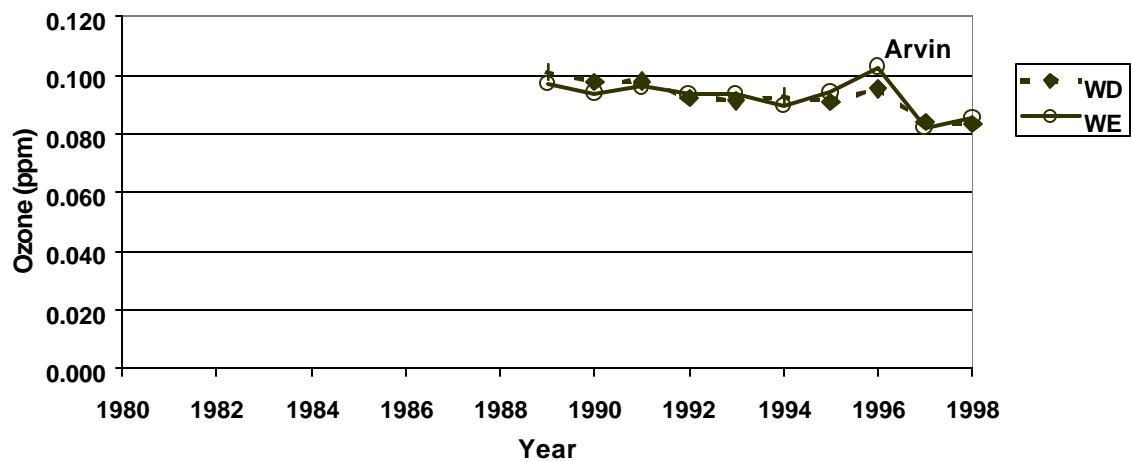


Figure 1.3-2 Averages by year based on data in Table 1.3-1.

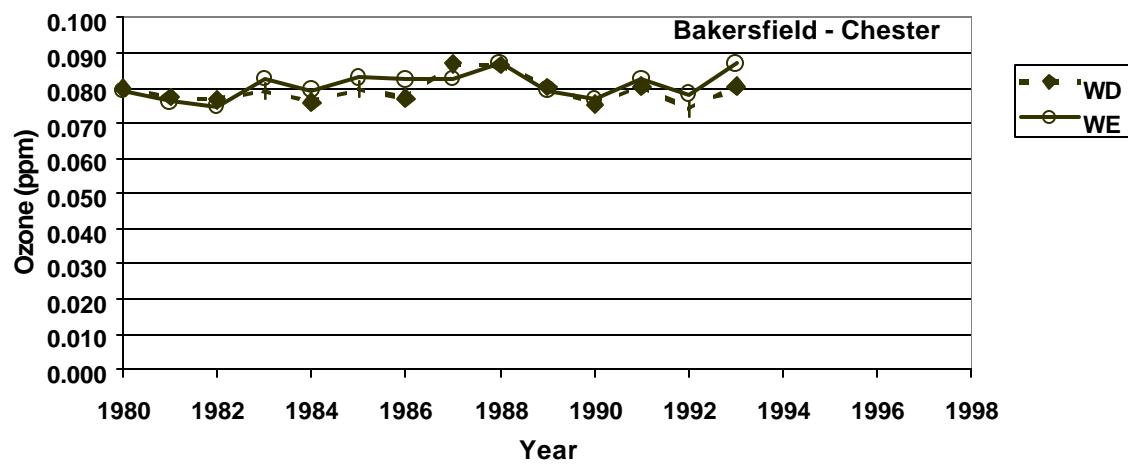


Figure 1.3-3 Averages by year based on data in Table 1.3-1.

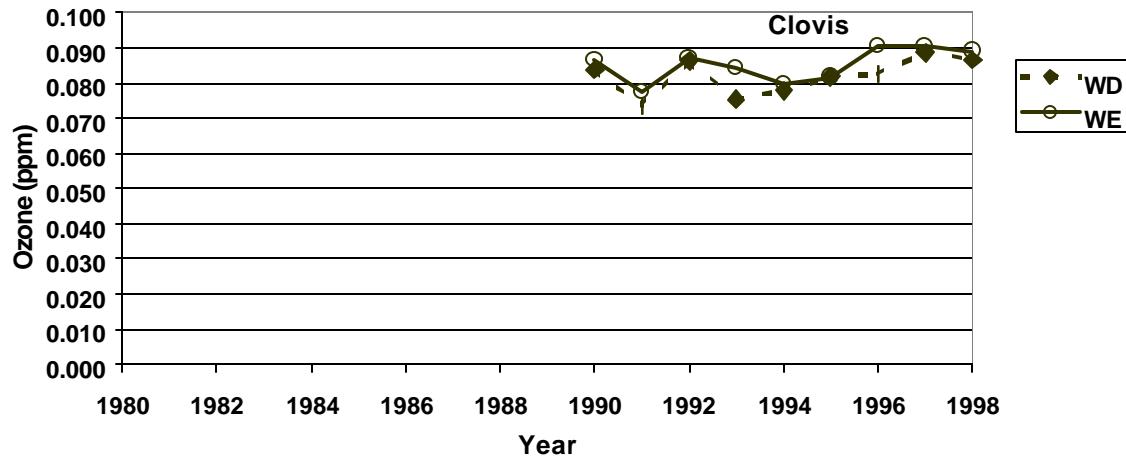


Figure 1.3-4 Averages by year based on data in Table 1.3-1.

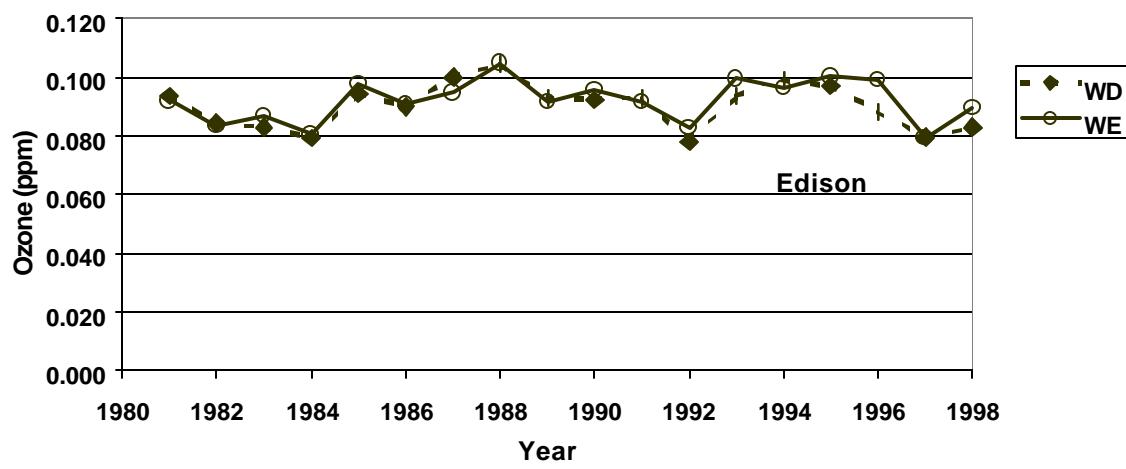


Figure 1.3-5 Averages by year based on data in Table 1.3-1.

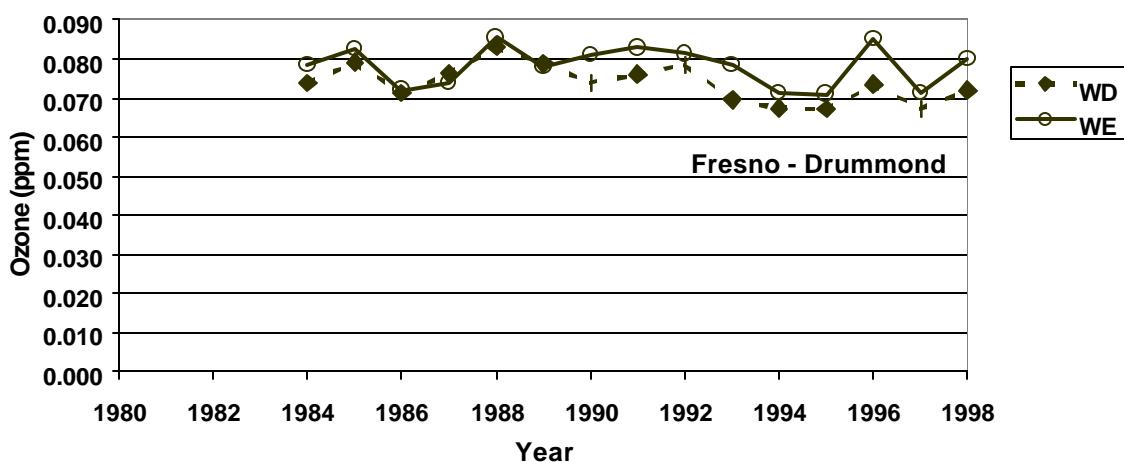


Figure 1.3-6 Averages by year based on data in Table 1.3-1.

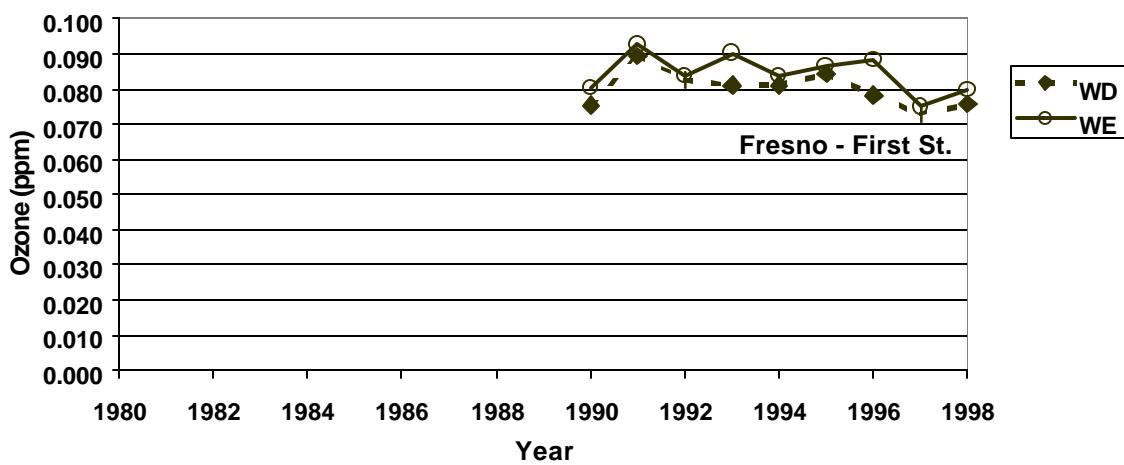


Figure 1.3-7 Averages by year based on data in Table 1.3-1.

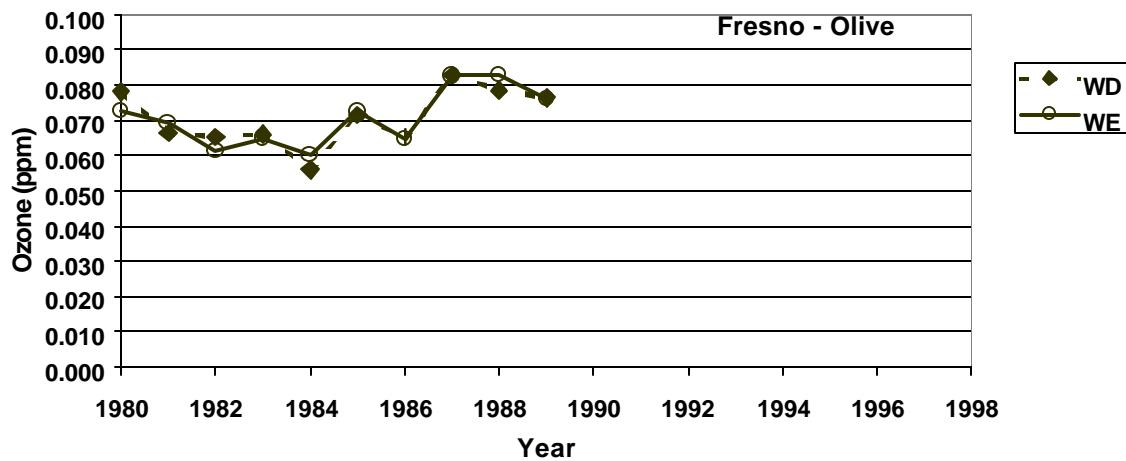


Figure 1.3-8 Averages by year based on data in Table 1.3-1.

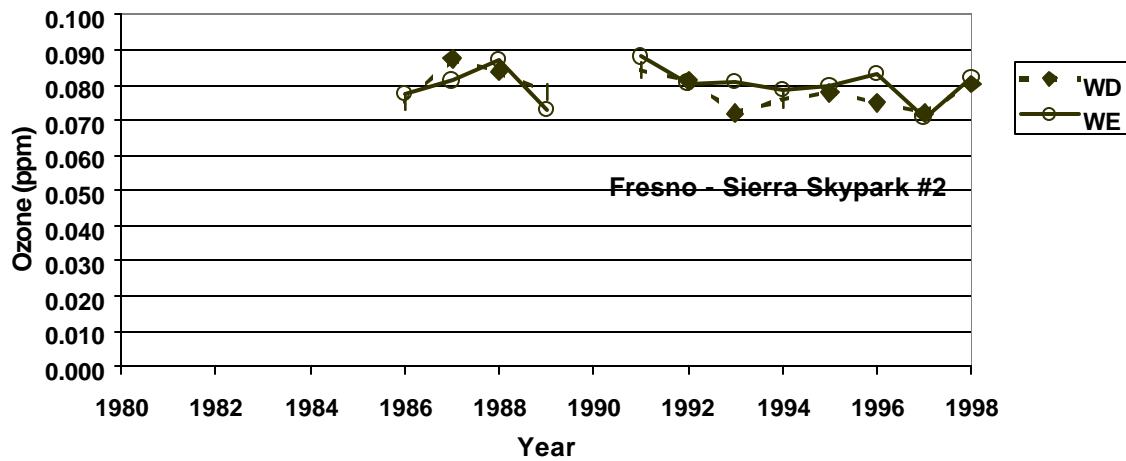


Figure 1.3-9 Averages by year based on data in Table 1.3-1.

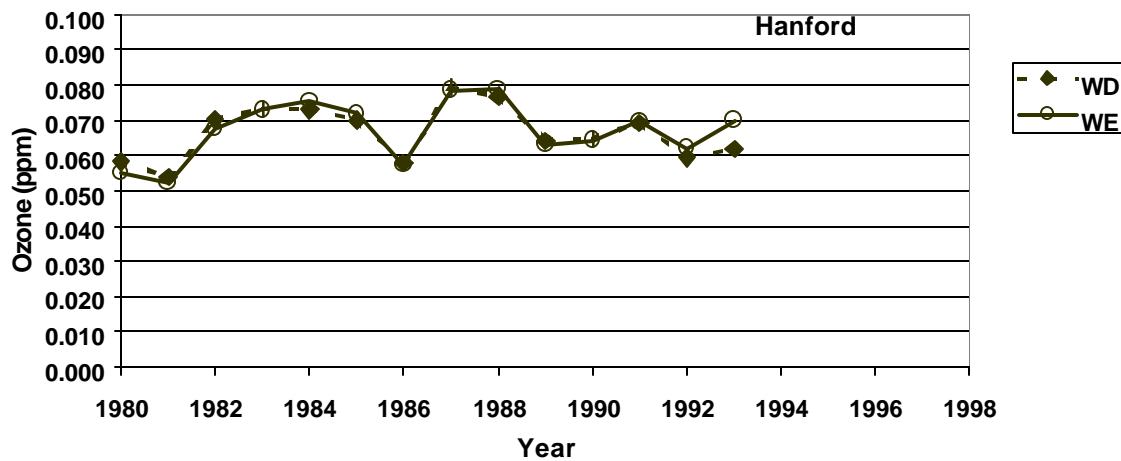


Figure 1.3-10 Averages by year based on data in Table 1.3-1.

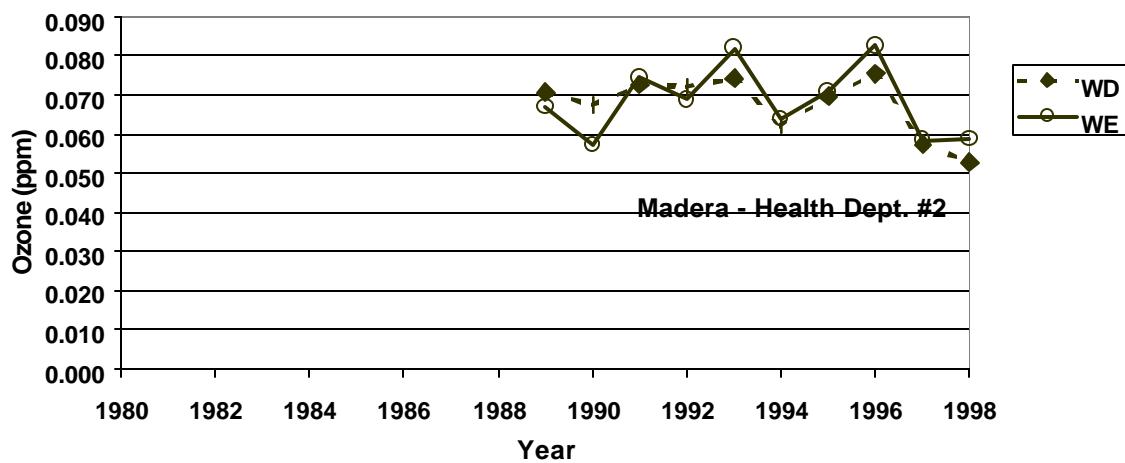


Figure 1.3-11 Averages by year based on data in Table 1.3-1.

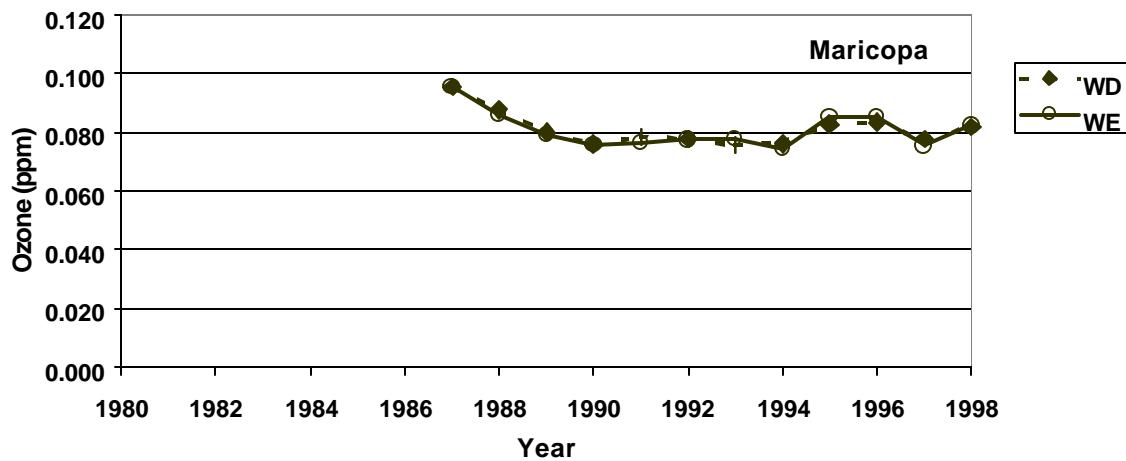


Figure 1.3-12 Averages by year based on data in Table 1.3-1.

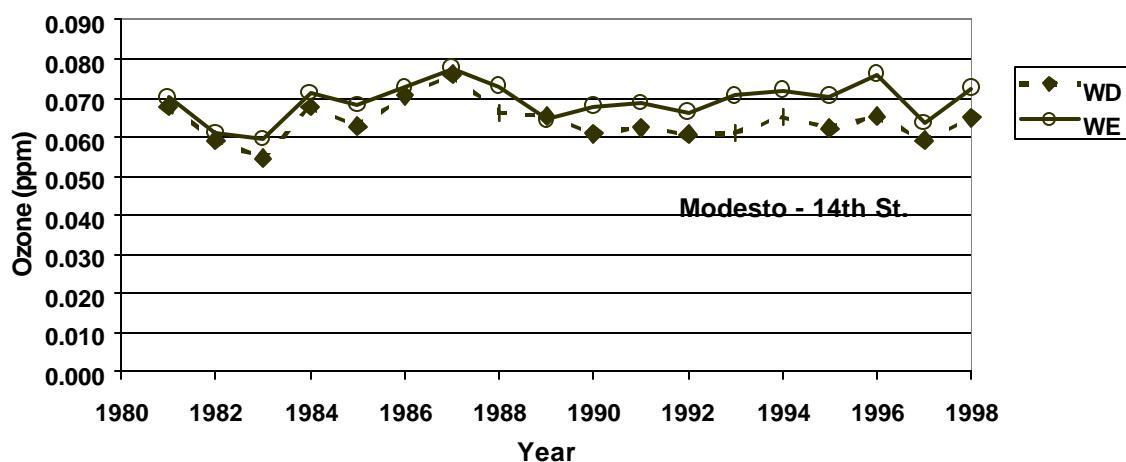


Figure 1.3-13 Averages by year based on data in Table 1.3-1.

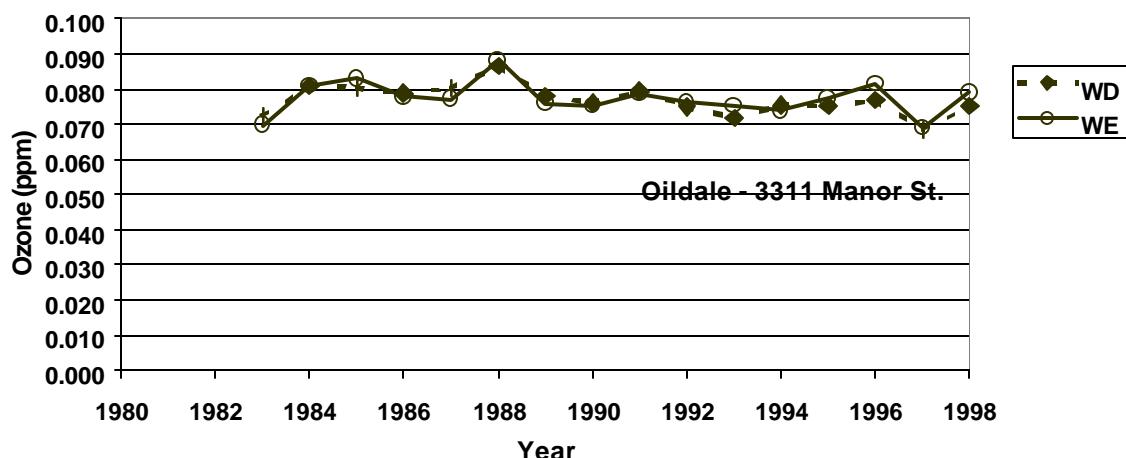


Figure 1.3-14 Averages by year based on data in Table 1.3-1.

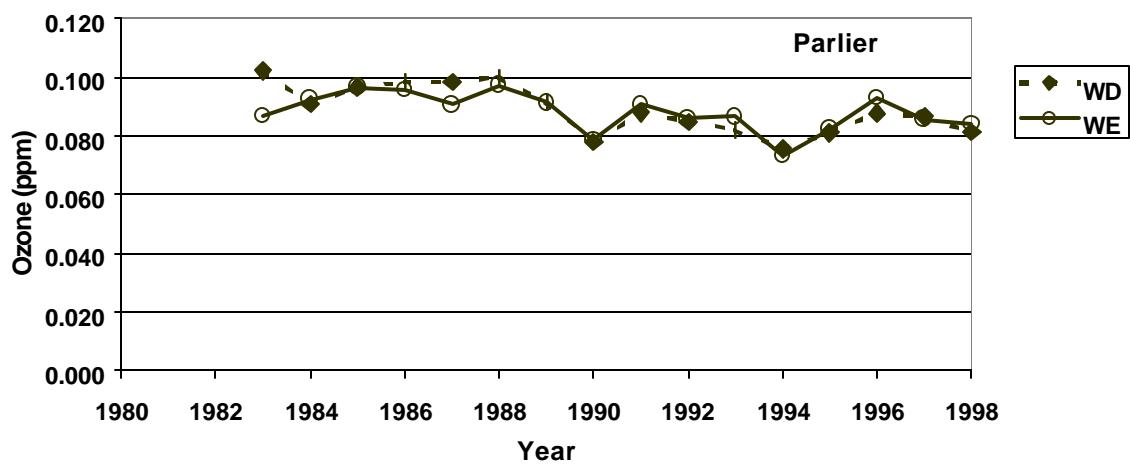


Figure 1.3-15 Averages by year based on data in Table 1.3-1.

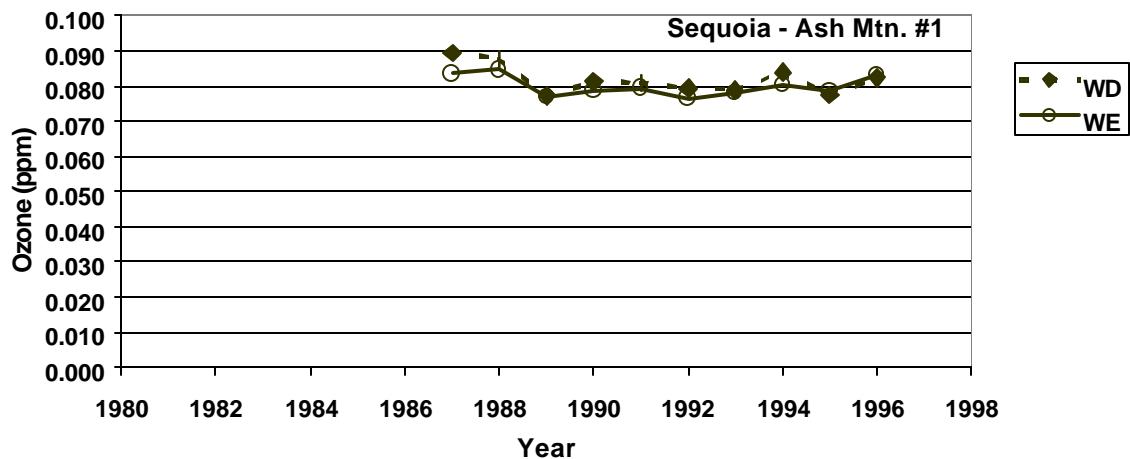


Figure 1.3-16 Averages by year based on data in Table 1.3-1.

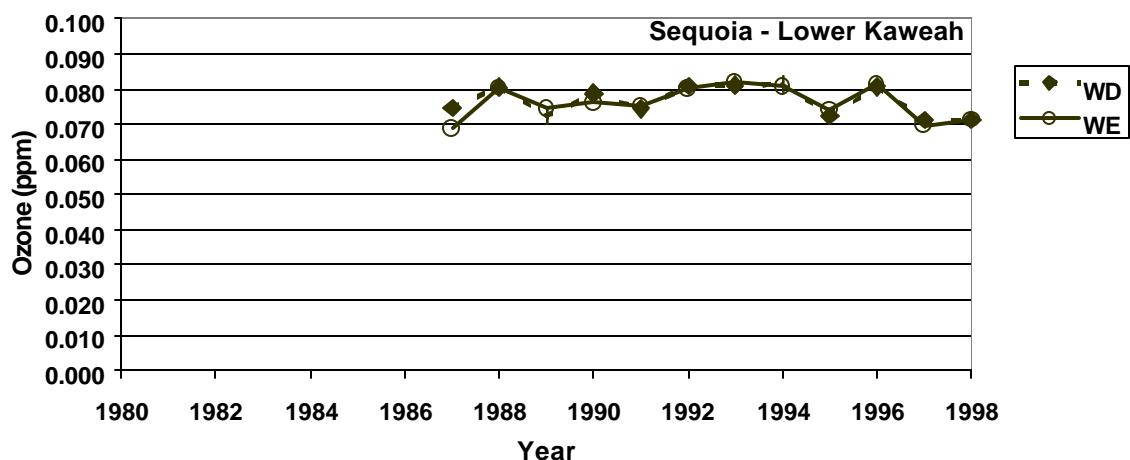


Figure 1.3-17 Averages by year based on data in Table 1.3-1.

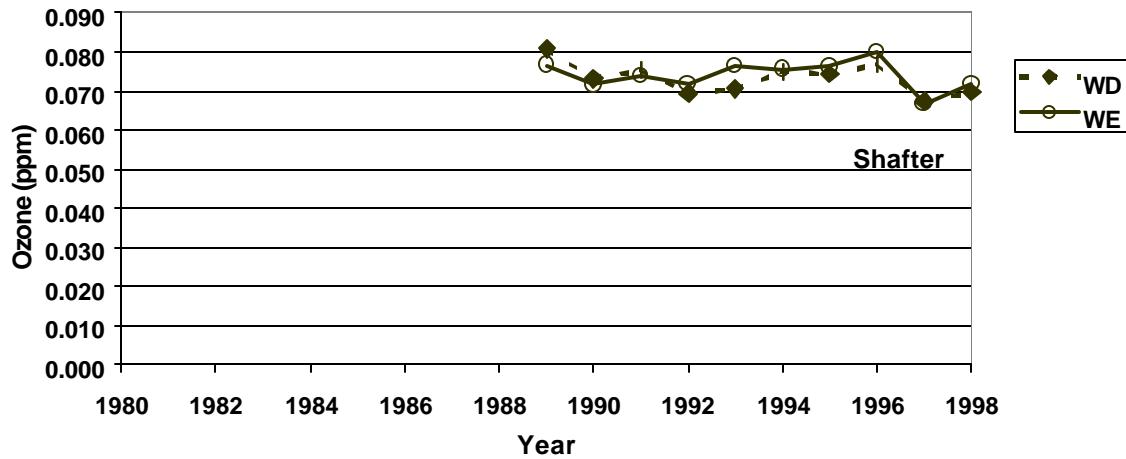


Figure 1.3-18 Averages by year based on data in Table 1.3-1.

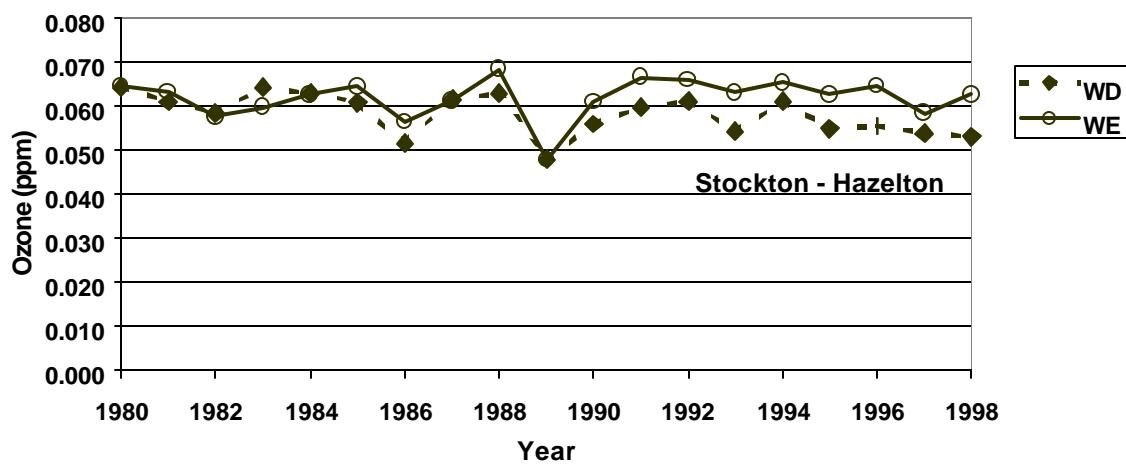


Figure 1.3-19 Averages by year based on data in Table 1.3-1.

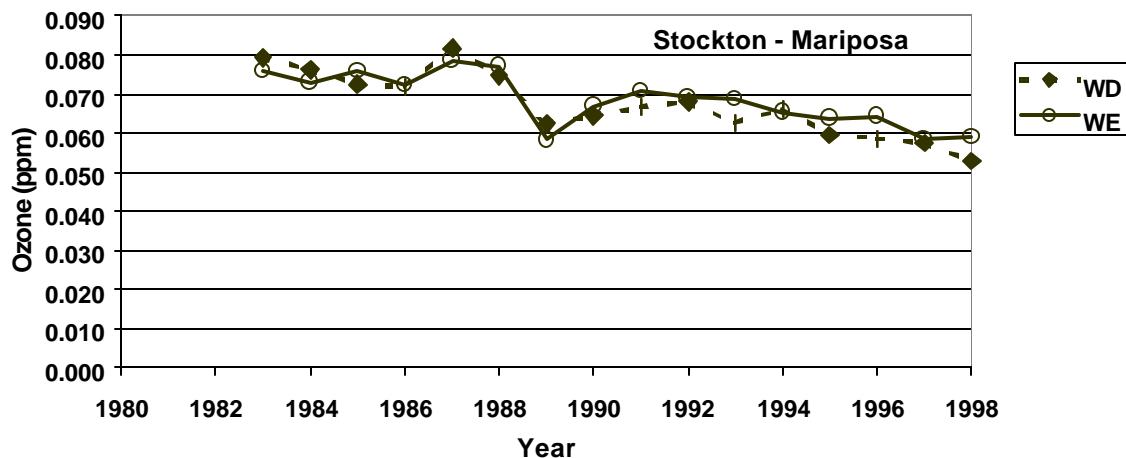


Figure 1.3-20 Averages by year based on data in Table 1.3-1.

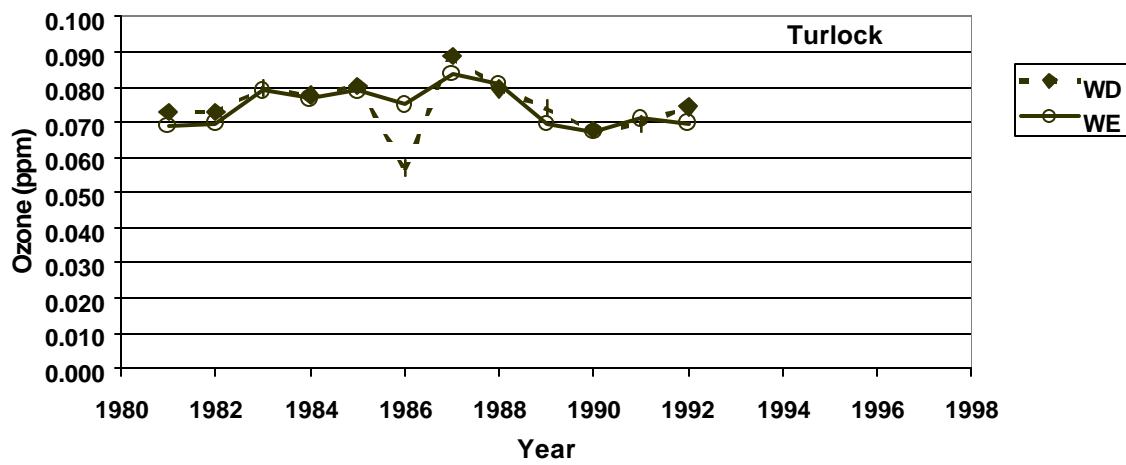


Figure 1.3-21 Averages by year based on data in Table 1.3-1.

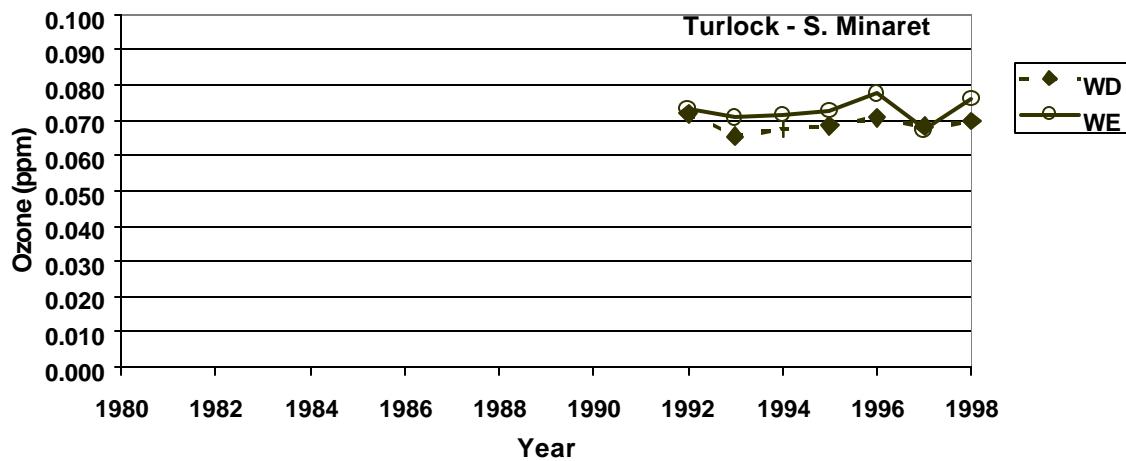
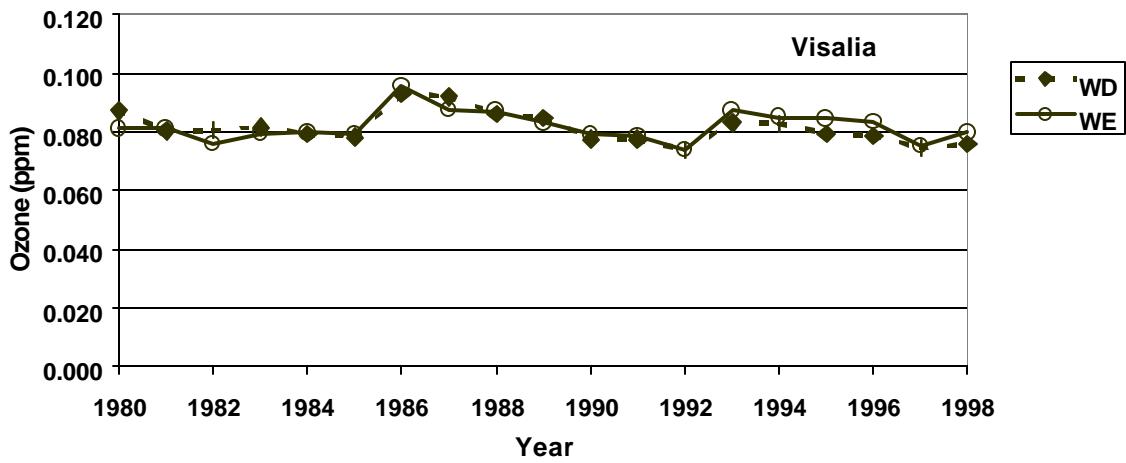


Figure 1.3-22 Averages by year based on data in Table 1.3-1.



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